

# GEN ENOMOTO

PHOTO-MICROBIOLOGIST Assistant Professor

*Born on Jul. 7. 1988. Father of two children (8-yo son and 6-yo daughter).*

Tokyo University of Agriculture,

1-1-1 Sakuragaoka, Setagaya, Tokyo, 156-8502, Japan

Email: [ge208493@nodai.ac.jp](mailto:ge208493@nodai.ac.jp)

Website: <https://genenomoto.github.io>

## TRAINING/ EMPLOYMENT

### Assistant Professor (PI)

2024-

Tokyo University of Agriculture,  
Department of Agricultural Chemistry

### Post-doc Japan Society for the Promotion of Science (JSPS) Restart Postdoctoral Research Fellow

2022-2024

The University of Electro-Communications,  
Graduate School of Informatics and Engineering  
*Lab Head: Prof. Daisuke Nakane*

### Post-doc Japan Society for the Promotion of Science (JSPS) Overseas Research Fellow

2020-2022

Albert-Ludwigs-Universität Freiburg,  
Institut für Biologie III  
*Lab Head: Prof. Annegret Wilde*

### Parental Leave (3 months)

2018

### Post-doc EMBO Long-Term Fellow

2018-2020

Albert-Ludwigs-Universität Freiburg,  
Institut für Biologie III  
*Lab Head: Prof. Annegret Wilde*

### Academic Fellow

2018-2019

The University of Tokyo,  
Graduate School of Arts and Sciences  
*Host Researcher: Prof. Masahiko Ikeuchi*

### Assistant Professor

2016-2018

The University of Tokyo,  
Graduate School of Arts and Sciences

Lab Head: Prof. Masahiko Ikeuchi

**EDUCATION**

**PhD** 2013-2016

The University of Tokyo,  
Graduate School of Arts and Sciences  
*Dissertation*: “Molecular mechanisms of cyanobacteriochrome signaling via c-di-GMP”  
*Supervisor*: Prof. Masahiko Ikeuchi

**MS** 2011-2013

The University of Tokyo,  
Graduate School of Arts and Sciences  
*Thesis*: “Biochemical analysis of cyanobacteriochromes from a thermophilic cyanobacterium *Thermosynechococcus*”  
*Advisor*: Prof. Masahiko Ikeuchi

**BS** 2007-2011

The University of Tokyo,  
College of Arts and Sciences  
*Major*: Biology

**HONORS,  
AWARDS, AND  
COMPETITIVELY  
ACQUIRED THIRD-  
PARTY FUNDS**

Research Grants for Young Researchers (Institute for Fermentation) 2024-2026

Grant-in-aid for Scientific Research (C) (Japan Society for the Promotion of Science (JSPS) KAKENHI grant No. 24K08659) 2024-2027

DOMPS paper of the year award 2022 by Freiburg Univ. 2023

JSPS Restart Postdoctoral Research Fellowship 2022-2025

Grants-in-Aid for JSPS Fellows 2022-2025

eLife early-career reviewer 2022-

JSPS Overseas Research Fellowship 2020-2022

Associate PI of DFG priority programme SPP 1879 2019-2022

EMBO Long-Term Fellowship 2018-2020

Grant-in-aid for Young Scientists (B) (Japan Society for the Promotion of Science (JSPS) KAKENHI grant No. 17K15244) 2017-2019

The president of Japanese society of young photosynthesis researchers 2017

Research Fellowships for Young Scientists by JSPS for Doctoral Course Students (DC1) **2013-2016**  
Grants-in-Aid for JSPS Fellows, **2013-2016**

**CONFERENCE  
PRESENTATIONS  
(INTERNATIONAL)**

**Oral**

○Gen Enomoto

**“The light-dependent induction of cell polarity and the switching of moving direction in the rod-shaped cyanobacterium *Thermosynechococcus*”**

International Conference On Tetrapyrrole Photoreceptors Of Photosynthetic Organisms (ICTPPO) 2023, (Shizuoka, Japan), **September 2023** (Invited)

○Gen Enomoto, Daisuke Nakane, and Annegret Wilde

**“Light-dependent induction of cell polarity and switching of moving direction in a rod-shaped cyanobacterium *Thermosynechococcus*”**

17th International Symposium on Phototrophic Prokaryotes (ISPP) (Liverpool, UK), **August 2022**

Nibedita Priyadarshini, Niklas Steube, Dennis Wiens, Rei Narikawa, Annegret Wilde, Georg K. A. Hochberg, and ○Gen Enomoto

**“Green light perception paved the way for the diversification of GAF domain photoreceptors”**

Young Researchers Symposium on Plant Photobiology 2020, (Online), **March 2022**

Daisuke Nakane, ○Gen Enomoto, Annegret Wilde and Takayuki Nishizaka

**“*Thermosynechococcus* switches the direction of phototaxis by a c-di-GMP dependent process with high spatial resolution”**

Green Aquatic Biology, German-Japanese meeting, (Potsdam, Germany), **March 2022**

Daisuke Nakane, ○Gen Enomoto, Annegret Wilde and Takayuki Nishizaka

**“*Thermosynechococcus* switches the direction of phototaxis by a c-di-GMP dependent process with high spatial resolution”**

6th Early Career Researcher Symposium on Cyanobacteria (Cyano2021), (Online), **November 2021**

○Gen Enomoto and Masahiko Ikeuchi

**“Cyanobacteriochrome-mediated blue/green light signaling is a population density-sensing system under photosynthesis-driving red light”**

10th European Workshop on the Molecular Biology of Cyanobacteria, (Cluj-Napoca, Romania), **August 2017**

- Gen Enomoto, Rei Narikawa, and Masahiko Ikeuchi  
“Cyanobacteriochrome trio as color-sensitive light input module for c-di-GMP signaling”  
9th European Workshop on the Molecular Biology of Cyanobacteria, ORAL3-6, (Texel, The Netherlands), **September 2014**

## **TEACHING EXPERIENCE**

*Albert-Ludwigs-Universität Freiburg Germany, 2018-*

### **Post-doc**

- Supervised one Bachelor student, one project student, and one master student. Co-supervised one PhD student.

*The University of Tokyo, Japan, 2016-2018*

**Assistant Professor**, Graduate School of Arts and Sciences,

- Taught Experimental course of Basic biology, an undergraduate course averaging 120 students per day in summer semester in cooperation with 7~8 assistant professors, covering molecular biology, microbiology, plant biology, cell biology, etc.

## **LANGUAGES**

**Japanese:** Native Language

**English:** B2 (self-assessments)

**German:** A2 (Goethe-Zertifikat. Score: 96/100, Sep. 15, 2023)

## PUBLICATIONS

\*Corresponding Author

**Enomoto, G.**, Wallner, T., Wilde, A. \*(2023)

Control of light-dependent behaviour in cyanobacteria by the second messenger cyclic di-GMP. (Review)

**microLife**, 4, 1-10

Priyadarshini, N., Steube, N., Wiens, D., Narikawa, R., Wilde, A., Hochberg, G.\* , and **Enomoto, G. \*** (2023)

Evidence for an early green/red photocycle that precedes the diversification of GAF domain photoreceptor cyanobacteriochromes.

**Photochem. Photobiol. Sci.**, 22, 1415-1427.

Nakane, D.\*<sup>1</sup>, **Enomoto, G.\***<sup>1</sup>, Bähre, H., Hirose, H., Wilde, A., and Nishizaka, T. (2022)

*Thermosynechococcus* switches the direction of phototaxis by a c-di-GMP dependent process with high spatial resolution.

**eLife**, 11, e73405

<sup>1</sup>equal contribution

Maeda, K., Okuda, Y., **Enomoto, G.**, Watanabe, S., and Ikeuchi, M. \* (2021)

Biosynthesis of a sulfated exopolysaccharide, synechan, and bloom formation in the model cyanobacterium *Synechocystis* sp. strain PCC 6803.

**eLife**, 10, e66538.

Fushimi, K., Hasegawa, M., Ito, T., Rockwell, N. C., **Enomoto, G.**, Lagarias, J. C., Ikeuchi, M., and Narikawa, R. \* (2020)

Evolution-inspired design of multicolored photoswitches from a single cyanobacteriochrome scaffold.

**Proc. Natl. Acad. Sci. USA** 117(27), 15573-15580

**Enomoto, G.**, Kamiya, A., Okuda, Y., Narikawa, R., and Ikeuchi, M. \* (2020)

Tlr0485 is a cAMP-activated c-di-GMP phosphodiesterase in a cyanobacterium *Thermosynechococcus*.

**The Journal of General and Applied Microbiology** 66(2), 147-152

**Enomoto, G.\*** and Ikeuchi, M. (2020)

Blue/green light-responsive cyanobacteriochromes are cell shade sensors in red-light replete niches.

**iScience** 23(3), 100936

**Enomoto, G.**, Wilde, A., and Ikeuchi, M.\* (2020)

Light-Regulated Nucleotide Second Messenger Signaling in Cyanobacteria.

**Microbial Cyclic Di-Nucleotide Signaling** (book chapter) 311-327

**Enomoto, G.\***, Okuda, Y., and Ikeuchi, M. (2018)

Tlr1612 is the major repressor of cell aggregation in the light-color-dependent c-di-GMP signaling network of *Thermosynechococcus vulcanus*.

**Scientific reports** 8, 5338

Hasegawa, M., Fushimi, K., Miyake, K., Nakajima, T., Oikawa, Y., **Enomoto, G.**, Sato, M., Ikeuchi, M., and Narikawa, R.\* (2018)

Molecular characterization of DXCF cyanobacteriochromes from the cyanobacterium *Acaryochloris marina* identifies a blue-light power sensor.

**J. Biol. Chem.** 293, 1713-1727

Fushimi, K., **Enomoto, G.**, Ikeuchi, M., and Narikawa, R.\* (2017)

Distinctive properties of dark reversion kinetics between two red/green-type cyanobacteriochromes and their application in the photoregulation of cAMP synthesis.

**Photochem. Photobiol.** 93, 681-691

Fushimi, K., Rockwell, N. C., **Enomoto, G.**, Ni Ni, W., Martin, S. S., Gan, F., Bryant, D. A., Ikeuchi, M., Lagarias, J. C., and Narikawa, R.\* (2016)

Cyanobacteriochrome photoreceptors lacking the canonical Cys residue.

**Biochemistry** 55, 6981-6995

Fortunato, A. E., Jaubert, M., **Enomoto, G.**, Bouly, J. P., Raniello, R., Thaler, M., Malviya, S., Bernardes, J. S., Rappaport, F., Gentili, B., Huysman, M. J., Carbone, A., Bowler, C., d'Alcala, M. R.\* , Ikeuchi, M., and Falciatore, A.\* (2016)

Diatom phytochromes reveal the existence of far-red-light-based sensing in the ocean.

**Plant Cell** 28, 616-628

**Enomoto, G.**, Ni Ni, W., Narikawa, R., and Ikeuchi, M.\* (2015)

Three cyanobacteriochromes work together to form a light color-sensitive input system for c-di-GMP signaling of cell aggregation.

**Proc. Natl. Acad. Sci. USA** 112, 8082-8087

Narikawa, R.\* , Nakajima, T., Aono, Y., Fushimi, K., **Enomoto, G.**, Ni Ni, W., Itoh, S., Sato, M., and Ikeuchi, M. (2015)

A biliverdin-binding cyanobacteriochrome from the chlorophyll *d*-bearing cyanobacterium *Acaryochloris marina*.

**Scientific reports** 5, 7950

**Enomoto, G.**, Nomura, R., Shimada, T., Ni Ni, W., Narikawa, R., and Ikeuchi, M.\* (2014)  
Cyanobacteriochrome SesA is a diguanylate cyclase that induces cell aggregation in *Thermosynechococcus*.

**J. Biol. Chem.** 289, 24801-24809

Narikawa, R.\* , **Enomoto, G.**, Ni Ni, W., Fushimi, K., and Ikeuchi, M. (2014)

A new type of dual-Cys cyanobacteriochrome GAF domain found in cyanobacterium *Acaryochloris marina*, which has an unusual red/blue reversible photoconversion cycle.

**Biochemistry** 53, 5051-5059

**Enomoto, G.**, Hirose, Y., Narikawa, R., and Ikeuchi, M.\* (2012)

Thiol-based photocycle of the blue and teal light-sensing cyanobacteriochrome Tlr1999.

**Biochemistry** 51, 3050-3058